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Glossary

ACCURACY. The degree of agreement between a measurement and its true value. The accuracy of a data set is assessed by evaluating results from standards or spikes containing known quantities of an analyte.

ACTION PLAN. An action plan addresses assessment findings and root causes that have been identified in an audit or an assessment report. It is intended to set forth specific actions that the site will undertake to remedy deficiencies. The plan includes a timetable and funding requirements for implementation of the planned activities.

ALLUVIAL FAN. A cone-shaped deposit of alluvium made by a stream where it runs out onto a level plain.

ALLUVIUM. Sedimentary material deposited by flowing water such as a river.

ANION. A negatively charged ion. An ion that would migrate toward a positively charged electrode during electrolysis.

AQUIFER. A water-bearing unit of permeable rock or soil that will yield water in usable quantities to wells. *Confined aquifers* are bounded above and below by less permeable layers. Groundwater in a confined aquifer is under a pressure greater than the atmospheric pressure. *Unconfined aquifers* are bounded below by less permeable material but are not bounded above. The pressure on the groundwater at the surface of an unconfined aquifer is equal to that of the atmosphere.

AS LOW AS REASONABLY ACHIEVABLE (ALARA). An approach to radiation protection that advocates controlling or managing exposures (both individual and collective) to the work force and the general public and releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit. As used in DOE Order 5400.5, ALARA is not a dose limit but, rather, a process that has as its objective the attainment of dose levels as far below the applicable limits of the Order as practicable.

BACKGROUND RADIATION. Natural and manmade radiation such as cosmic radiation and radiation from naturally radioactive elements and from commercial sources and medical procedures.

BECQUEREL (Bq). A unit of radioactivity equal to one nuclear transformation per second.

CATEGORICAL EXCLUSION. A proposed action that normally does not require an ENVIRONMENTAL ASSESSMENT or an ENVIRONMENTAL IMPACT STATEMENT and that the Department of Energy has determined does not individually or cumulatively have a significant effect on the human environment. See 10 CFR 1021.410.

Glossary

CATION. A positively charged ion. An ion that would move toward a negatively charged electrode during electrolysis.

CLASS A, B, AND C LOW-LEVEL WASTE. Waste classifications from the Nuclear Regulatory Commission's 10 CFR Part 61 rule. Maximum concentration limits are set for specific isotopes. Class A waste disposal is minimally restricted with respect to the form of the waste. Class B waste must meet more rigorous requirements to ensure physical stability after disposal. Greater concentration limits are set for the same isotopes in Class C waste, which also must meet physical stability requirements. Moreover, special measures must be taken at the disposal facility to protect against inadvertent intrusion.

COMPLIANCE FINDINGS. Conditions that may not satisfy applicable environmental or safety and health regulations, DOE Orders and memoranda, enforcement actions, agreements with regulatory agencies, or permit conditions.

CONFIDENCE COEFFICIENT OR FACTOR. The chance or probability, usually expressed as a percentage, that a confidence interval includes some defined parameter of a population. The confidence coefficients usually associated with confidence intervals are 90%, 95%, and 99%.

CONSISTENCY. The condition of showing steady conformity to practices. In the environmental monitoring program, approved procedures are in place in order to ensure that data collection activities are carried out in a consistent manner so that variability is minimized.

COSMIC RADIATION. High-energy subatomic particles from outer space that bombard the earth's atmosphere. Cosmic radiation is part of natural background radiation.

COUNTING ERROR. The variability caused by the inherent random nature of radioactive disintegration and by the detection process.

CURIE (Ci). A unit of radioactivity equal to 37 billion (3.7×10^{10}) nuclear transformations per second.

DECAY (RADIOACTIVE). Disintegration of the nucleus of an unstable nuclide by spontaneous emission of charged particles and/or photons or by spontaneous fission.

DERIVED CONCENTRATION GUIDE (DCG). The concentration of a radionuclide in air and water that, under conditions of continuous exposure for one year by one exposure mode (i.e., ingestion of water, submersion in air, or inhalation), would result in an effective dose equivalent of 100 mrem (1 msv). (See Table B-1 in Appendix B.)

DETECTION LIMIT OR LEVEL. The smallest amount of a substance that can be distinguished in a sample by a given measurement procedure at a given confidence level. (See LOWER LIMIT OF DETECTION.)

DISPERSION (GROUNDWATER). The process whereby solutes are spread or mixed as they are transported by groundwater as it moves through sediments.

DOSIMETER. A portable device for measuring the total accumulated exposure to ionizing radiation.

DOWNGRADIENT. The direction of water flow from a reference point to a selected point of interest. (See GRADIENT.)

EFFECTIVE DOSE. See EFFECTIVE DOSE EQUIVALENT under RADIATION DOSE.

EFFLUENT. Any treated or untreated air emission or liquid discharge, including storm water runoff, at a DOE site or facility.

EFFLUENT MONITORING. Sampling or measuring specific liquid or gaseous effluent streams for the presence of pollutants.

ENVIRONMENTAL ASSESSMENT. An evaluation that provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. See 40 CFR 1508.9.

ENVIRONMENTAL IMPACT STATEMENT. A detailed statement that includes the environmental impact of the proposed action, any adverse environmental effects that cannot be avoided should the proposal be implemented, and alternatives to the proposed action. See Section 102 (2) (C) of the National Environmental Policy Act.

ENVIRONMENTAL MONITORING. The collection and analysis of samples or the direct measurement of environmental media. Environmental monitoring consists of two major activities: effluent monitoring and environmental surveillance.

ENVIRONMENTAL SURVEILLANCE. The collection and analysis of samples or the direct measurement of air, water, soil, foodstuff, and biota in order to determine compliance with applicable standards and permit requirements.

ERG. One-billionth (1E-09) of the energy released by a 100-watt bulb in 1 second.

EVAPOTRANSPIRATION. The combined total precipitation returned to the air through direct evaporation and by transpiration of vegetation.

EXPOSURE. The subjection of a target (usually living tissue) to radiation.

FALLOUT. Radioactive materials mixed into the earth's atmosphere. Fallout constantly precipitates onto the earth.

Glossary

FINDING. A Department of Energy compliance term. A finding is a statement of fact concerning a condition in the Environmental, Safety, and Health program that was investigated during an appraisal. Findings include best management practice findings, compliance findings, and noteworthy practices. A finding may be a simple statement of proficiency or a description of deficiency (i.e., a variance from procedures or criteria). See also SELF-ASSESSMENT.

FISSION. The act or process of splitting into parts. A nuclear reaction in which an atomic nucleus splits into fragments, i.e., fission products, usually fragments of comparable mass, with the evolution of approximately 100 million to several hundred million electron volts of energy.

GAMMA ISOTOPIC (also **GAMMA SCAN).** An analytical method by which the quantity of several gamma ray-emitting radioactive isotopes may be determined simultaneously. Typical nuclear fuel cycle isotopes determined by this method include but are not limited to Co-60, Zr-95, Ru-106, Ag-110m, Sb-125, Cs-134, Cs-137, and Eu-154. Naturally occurring isotopes that are often requested include Be-7, K-40, Ra-224, and Ra-226.

GRADIENT. Change in value of one variable with respect to another variable, especially vertical or horizontal distance.

GROUNDWATER. Subsurface water in the pore spaces of soil and geologic units.

HALF-LIFE. The time in which half the atoms of a radionuclide disintegrate into another nuclear form. The half-life may vary from a fraction of a second to thousands of years.

HIGH-LEVEL WASTE (HLW). The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of transuranic waste and fission products in concentrations sufficient to require permanent isolation. (See also TRANSURANIC WASTE.)

HYDRAULIC CONDUCTIVITY. The ratio of flow velocity to driving force for viscous flow under saturated conditions of a specified liquid in a porous medium; the ratio describing the rate at which water can move through a permeable medium.

INTERIM STATUS. Any facility in existence on the effective date of statutory or regulatory amendments under RCRA that render the facility subject to the requirement to have a RCRA permit. An interim status facility shall be treated as having been issued a permit (Title 6 New York Code of Rules and Regulations **[NYCRR]** Part 373.

INTERSTITIAL. The (annular) space between the inner and outer tank walls in a double-walled storage tank.

ION. An atom or group of atoms with an electric charge.

ION EXCHANGE. The reversible exchange of ions contained in solution with other ions that are part of the ion-exchange material.

ISOTOPE. Different forms of the same chemical element that are distinguished by having the same number of protons but a different number of neutrons in the nucleus. An element can have many isotopes. For example, the three isotopes of hydrogen are protium, deuterium, and tritium, with one, two, and three neutrons in the nucleus, respectively.

KAME DELTA. A conical hill or short irregular ridge of gravel or sand deposited in contact with glacier ice.

LACUSTRINE SEDIMENTS. A sedimentary deposit consisting of material pertaining to, produced by, or formed in a lake or lakes.

LAND DISPOSAL RESTRICTIONS (LDR). Regulations promulgated by the U.S. EPA (and by NYSDEC in New York State) governing the land disposal of hazardous wastes. The wastes must be treated using the best demonstrated available technology or must meet certain treatment standards before being disposed.

LOWER LIMIT OF DETECTION (LLD). The lowest limit of a given parameter an instrument is capable of detecting. A measurement of analytical sensitivity.

LOW-LEVEL WASTE (LLW). Radioactive waste not classified as high-level waste, transuranic waste, spent fuel, or uranium mill tailings. (See CLASS A, B, AND C LOW-LEVEL WASTE.)

MAXIMALLY EXPOSED INDIVIDUAL. A hypothetical person who remains in an uncontrolled area who would, when all potential routes of exposure from a facility's operations are considered, receive the greatest possible dose equivalent.

MEAN. The average value of a series of measurements.

MILLIREM (MREM). A unit of radiation dose equivalent that is equal to one one-thousandth of a rem. An individual member of the public can receive up to 500 millirems per year according to DOE standards. This limit does not include radiation received for medical treatment or the 100 to 360 mrem that people receive annually from background radiation.

MINIMUM DETECTABLE CONCENTRATION (MDC). Depending on the sample medium, the smallest amount or concentration of a radioactive or nonradioactive analyte that can be reliably detected using a specific analytical method. Calculations of the minimum detectable concentrations are based on the lower limit of detection.

MIXED WASTE. A waste that is both radioactive and hazardous. Also referred to as RADIOACTIVE MIXED WASTE (RMW).

Glossary

N-DODECANE/TRIBUTYL PHOSPHATE. An organic solution composed of 30% tributyl phosphate (TBP) dissolved in n-dodecane used to first separate the uranium and plutonium from the fission products in the dissolved fuel and then to separate the uranium from the plutonium.

NEUTRON. An electrically neutral subatomic particle in the baryon family with a mass 1,839 times that of an electron, stable when bound in an atomic nucleus, and having a mean lifetime of approximately 16.6 minutes as a free particle.

NOTICE OF VIOLATION. A letter of notice from a regional water engineer in response to an instance of significant noncompliance with a SPDES permit. Generally, an official notification from a regulatory agency of noncompliance with permit requirements.

NUCLEUS. The positively charged central region of an atom, made up of protons and neutrons and containing almost all of the mass of the atom.

OUTFALL. The end of a drain or pipe that carries wastewater or other effluents into a ditch, pond, or river.

PARAMETER. Any of a set of physical properties whose values determine the characteristics or behavior of something (e.g., temperature, pressure, density of air). In relation to environmental monitoring, a monitoring parameter is a constituent of interest. Statistically, the term "parameter" is a calculated quantity, such as a mean or variance, that describes a statistical population.

PARTICULATES. Solid particles and liquid droplets small enough to become airborne.

PERSON-REM. The sum of the individual radiation dose equivalents received by members of a certain group or population. It may be calculated by multiplying the average dose per person by the number of persons exposed. For example, a thousand people each exposed to one millirem would have a collective dose of one person-rem.

PLUME. The distribution of a pollutant in air or water after being released from a source.

PRECISION. The degree of reproducibility of a measurement under a given set of conditions. Precision in a data set is assessed by evaluating results from duplicate field or analytical samples.

PROGLACIAL LAKE. A lake occupying a basin in front of a glacier; generally in direct contact with the ice.

PROTON. A stable, positively charged subatomic particle in the bayron family with a mass of 1,836 times that of an electron.

PSEUDO-MONITORING POINT. A theoretical monitoring location rather than an actual physical location; a calculation based on analytical test results of samples obtained from other associated, tributary monitored locations.(Point 116 is classified as a"pseudo" monitoring point because samples are not

actually physically collected at that location. Rather, using analytical results from samples collected from "real" upstream outfall locations, compliance with the total dissolved solids limit in the WVDP's SPDES permit is calculated for this theoretical point.)

QUALITY FACTOR. The extent of tissue damage caused by different types of radiation of the same energy. The greater the damage, the higher the quality factor. More specifically, the factor by which absorbed doses are multiplied to obtain a quantity that indicates the degree of biological damage produced by ionizing radiation. (See RADIATION DOSE.) The factor is dependent upon radiation type (alpha, beta, gamma, or x-ray) and exposure (internal or external).

RAD. Radiation absorbed dose. One hundred ergs of energy absorbed per gram.

RADIATION. The process of emitting energy in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of alpha, beta, or gamma radiation.

ALPHA RADIATION. The least penetrating type of radiation. Alpha radiation can be stopped by a sheet of paper or the outer dead layer of skin.

BETA RADIATION. Electrons emitted from a nucleus during fission and nuclear decay. Beta radiation can be stopped by an inch of wood or a thin sheet of aluminum.

GAMMA RADIATION. A form of electromagnetic, high-energy radiation emitted from a nucleus. Gamma rays are essentially the same as x-rays and require heavy shielding such as lead, concrete, or steel to be stopped.

INTERNAL RADIATION. Radiation originating from a source within the body as a result of the inhalation, ingestion, or implantation of natural or manmade radionuclides in body tissues.

RADIATION DOSE:

ABSORBED DOSE. The amount of energy absorbed per unit mass in any kind of matter from any kind of ionizing radiation. Absorbed dose is measured in rads or grays.

COLLECTIVE DOSE EQUIVALENT. The sum of the dose equivalents for all the individuals comprising a defined population. The per capita dose equivalent is the quotient of the collective dose equivalent divided by the population. The unit of collective dose equivalent is person-rem or person-sievert.

COLLECTIVE EFFECTIVE DOSE EQUIVALENT. The sum of the effective dose equivalents for the individuals comprising a defined population. Units of measurement are person-rems or person-sieverts. The per capita effective dose equivalent is obtained by dividing the collective dose equivalent by the population. Units of measurement are rems or sieverts.

Glossary

COMMITTED DOSE EQUIVALENT. A measure of internal radiation. The predicted total dose equivalent to a tissue or organ over a fifty-year period after a known intake of a radionuclide into the body. It does not include contributions from sources of external penetrating radiation. Committed dose equivalent is measured in rems or sieverts.

COMMITTED EFFECTIVE DOSE EQUIVALENT. The sum of the committed dose equivalents to various tissues in the body, each multiplied by the appropriate weighting factor. Committed effective dose equivalent is measured in rems or sieverts.

RADIOACTIVITY. A property possessed by some elements such as uranium whereby alpha, beta, or gamma rays are spontaneously emitted.

RADIOISOTOPE. A radioactive isotope of a specified element. Carbon-14 is a radioisotope of carbon. Tritium is a radioisotope of hydrogen. (See ISOTOPE.)

RADIONUCLIDE. A radioactive nuclide. Radionuclides are variations (isotopes) of elements. They have the same number of protons and electrons but different numbers of neutrons, resulting in different atomic masses. There are several hundred known nuclides, both manmade and naturally occurring.

REM. An acronym for Roentgen Equivalent Man. A unit of radiation exposure that indicates the potential effect of radiation on human cells.

SELF-ASSESSMENT. Self-assessments are appraisals conducted by the WVDP to identify and correct any existing deficiencies in the environmental monitoring program. Under the WVDP environmental monitoring procedure *Self-Assessments for Environmental Programs*, information obtained from an appraisal is categorized as follows:

KEY FINDING. A direct and significant violation of a Department of Energy regulatory or other applicable guidance or procedural requirement, or a recurring pattern of observed deficiencies that could result in such a violation. A finding is a deficiency that requires corrective action.

OBSERVATION. A weakness that, if not corrected, could result in a deficiency. An observation may result if an explicit procedural nonconformance is noted but the nonconformance is an isolated incident or of minor significance. An observation requires corrective action.

COMMENT OR CONCERN. A comment is a subjective opinion of the assessment team that may be used to improve any of the specific environmental monitoring program activities, noted in *Self-Assessments for Environmental Programs,* such as sample collection, preparation, logging, storage, and shipping; instrument and equipment calibration; data receipt and data entry; training requirements and records; and compliance with discharge permit requirements. Corrective action in response to a comment or concern is at the discretion of the cognizant staff.

COMMENDABLE PRACTICE. A significant strength noted during the course of a self-assessment.

DEFICIENCY. A condition that does not meet or cannot be documented to meet applicable requirements.

SIEVERT. A unit of dose equivalent from the International System of Units (Systeme Internationale). Equal to one joule per kilogram.

SOLID WASTE MANAGEMENT UNIT (SWMU). Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

SPENT FUEL. Nuclear fuel that has been used in a nuclear reactor; this fuel contains uranium, activation products, fission products, and plutonium.

STANDARD DEVIATION. An indication of the dispersion of a set of results around their average.

SUPER SOLID WASTE MANAGEMENT UNIT (SSWMU). Individual solid waste management units that have been grouped and ranked into larger units — super solid waste management units — because some individual units are contiguous or so close together as to make monitoring of separate units impractical.

SURFACE WATER. Water that is exposed to the atmospheric conditions of temperature, pressure, and chemical composition at the surface of the earth.

SURVEILLANCE. The act of monitoring or observing a process or activity to verify conformance with specified requirements.

THERMOLUMINESCENT DOSIMETER (TLD). A device that luminesces upon heating after being exposed to radiation. The amount of light emitted is proportional to the amount of radiation to which the luminescent material has been exposed.

TRANSURANIC WASTE. Waste containing transuranic elements, i.e., those elements with an atomic number greater than 92, including neptunium, plutonium, americium, and curium.

UPGRADIENT. Referring to the flow of water or air, "upgradient" is analogous to upstream. Upgradient is a point that is "before" an area of study that is used as a baseline for comparison with downstream data. See GRADIENT and DOWNGRADIENT.

WATERSHED. The area contained within a drainage divide above a specified point on a stream.

WATER TABLE. The upper surface in a body of groundwater; the surface in an unconfined aquifer or confining bed at which the pore water pressure is equal to atmospheric pressure.

X-RAY. Penetrating electromagnetic radiations having wave lengths shorter than those of visible light. They are usually produced by bombarding a metallic target with fast electrons in a high vacuum. In nuclear reactions it is customary to refer to photons originating in the nucleus as gamma rays and those originating in the extranuclear part of the atom as x-rays. These rays are sometimes called roentgen rays after their discoverer, W.C. Roentgen.

Acronyms

AEA. Atomic Energy Act

ALARA. As Low As Reasonably Achievable

BEIR. Committee on Biological Effects of Ionizing Radiation

BOD-5. Biochemical Oxygen Demand (5-day)

CAA. Clean Air Act

CDDL. Construction and Demolition Debris Landfill

CEDE. Committed Effective Dose Equivalent

CEQ. (President's) Council on Environmental Quality

CERCLA. Comprehensive Environmental Response, Compensation, and Liability Act

CFR. Code of Federal Regulations

CO. Certificate-to-Operate

CSPF. Container Sorting and Packaging Facility

CPC. Chemical Process Cell

CSRF. Contact Size-reduction Facility

CSS. Cement Solidification System

CWA. Clean Water Act

CX. Categorical Exclusion

CY. Calendar Year

DCG. Derived Concentration Guide

DE. Dose Equivalent

DMR. Discharge Monitoring Report

DOE. (U.S.) Department of Energy

DOE-EM. (U.S.) Department of Energy, Office of Environmental Restoration and Waste Management

DOE-HQ. Department of Energy, Headquarters Office

DOE-OH. Department of Energy, Ohio Field Office

DOE-WV. Department of Energy, West Valley Demonstration Project

EA. Environmental Assessment

EDE. Effective Dose Equivalent

EE. Environmental Evaluation

Acronyms

EHS. Extremely Hazardous Substance
EID. Environmental Information Document
EIS. Environmental Impact Statement
ELAP. Environmental Laboratory Approval Program
EML. Environmental Measurements Laboratory
EPA. (U.S.) Environmental Protection Agency
EPI. Environmental Physics, Inc.
EPCRA. Emergency Planning and Community Right-to-Know Act
ESQA&LO. Environmental Safety, Quality Assurance, and Laboratory Operations
ESR. (WVDP) Effluent Summary Report
FFC Act. Federal Facility Compliance Act
FONSI. Finding of No Significant Impact
FSFCA. Federal and State Facility Compliance Agreement
FY. Fiscal Year
HEPA. High-efficiency Particulate Air (filter)
HLW. High-level (radioactive) Waste
HPIC. High-pressure Ion Chamber
HVAC. Heating, Ventilation, and Air Conditioning
ICRP. International Commission on Radiological Protection
INEEL. Idaho National Environmental Engineering Laboratory
IRTS. Integrated Radwaste Treatment System
LAS. Linear Alkylate Sulfonate
LDR. Land Disposal Restriction
LIMS. Laboratory Information Management System
LLD. Lower Limit of Detection
LLW. Low-level (radioactive) Waste
LLWTF. Low-level Liquid Waste Treatment Facility
LPS. Liquid Pretreatment System
LWTS. Liquid Waste Treatment System
MDC. Minimum Detectable Concentration
MDL. Method Detection Limit
MSDS. Material Safety Data Sheet

MTAR. Monthly Trend Analysis Report
NCRP. National Council on Radiation Protection and Measurements
NDA. Nuclear Regulatory Commission-licensed Disposal Area
NEPA. National Environmental Policy Act
NERL ESD. National Exposure Research Laboratory, Environmental Sciences Division
NESHAP. National Emissions Standards for Hazardous Air Pollutants
NFS. Nuclear Fuel Services, Inc.
NIST. National Institute of Standards and Technology
NOI. Notice of Intent
NPOC. Nonpurgeable Organic Carbon
NPDES. National Pollutant Discharge Elimination System
NRC. (U.S.) Nuclear Regulatory Commission
NYCRR. New York Official Compilation of Codes, Rules, and Regulations
NYSDEC. New York State Department of Environmental Conservation
NYSDOH. New York State Department of Health
NYSERDA. New York State Energy Research and Development Authority
NYSGS. New York State Geological Survey
ODIS. On-site Discharge Information System Report
OSHA. Occupational Safety and Health Act
OSR. Operational Safety Requirement
OVE. Outdoor Ventilated Enclosure
PC. Permit-to-Construct
PCB. Polychlorinated biphenyl
PQL. Practical Quantitation Limit
PVU. Portable Ventilation Unit
QA. Quality Assurance
QAP. Quality Assessment Program (also Quality Assurance Program)
QC. Quality Control
QEMDR. Quarterly Environmental Monitoring Data Report
RCRA. Resource Conservation and Recovery Act
RFI. RCRA Facility Investigation
RMW. Radioactive Mixed Waste
RTS. Radwaste Treatment System

Acronyms

SAR. Safety Analysis Report
SARA. Superfund Amendments and Reauthorization Act
SD. Standard Deviation
SDA. (New York) State-licensed Disposal Area
SDWA. Safe Drinking Water Act
SER. Site Environmental Report
SI. Systeme Internationale (International System of Units)
SPDES. State Pollutant Discharge Elimination System
STS. Supernatant Treatment System
SVOC. Semivolatile Organic Compound
SWMU. Solid Waste Management Unit
SSWMU. Super Solid Waste Management Unit
TCL. Target Compound List
TIC. Tentatively Identified Compound
TLD. Thermoluminescent Dosimetry
TOC. Total Organic Carbon
TOX. Total Organic Halogens
TRI. Toxic Release Inventory
TSCA. Toxic Substances and Control Act
TSDF. Treatment, Storage, and Disposal Facility
USGS. U.S. Geological Survey
VOC. Volatile Organic Compound
WNYNSC. Western New York Nuclear Service Center
WVDP. West Valley Demonstration Project
WVNS. West Valley Nuclear Services Company, Inc.
WWTF. Wastewater Treatment Facility

Units of Measure

	Symbol	*Name*
Radioactivity	Ci	curie
	mCi	millicurie (1E-03 Ci)
	µCi	microcurie (1E-06 Ci)
	nCi	nanocurie (1E-09 Ci)
	pCi	picocurie (1E-12 Ci)
	Bq	becquerel (27 pCi)

	Symbol	*Name*
Volume	cm^3	cubic centimeter
	L	liter
	mL	milliliter
	m^3	cubic meter
	gal	gallon
	ft^3	cubic feet
	ppm	parts per million
	ppb	parts per billion

	Symbol	*Name*
Dose	Sv	sievert (100 rems)
	mSv	millisievert (1E-03 Sv)
	Gy	gray (100 rads)

	Symbol	*Name*
Area	ha	hectare (10,000 m^2)

	Symbol	*Name*
Concentration	µCi/mL	microcuries per milliliter
	mL/L	milliliter per liter
	µCi/g	microcuries per gram
	mg/L	milligrams per liter
	µg/mL	micrograms per milliliter

	Symbol	*Name*
Length	m	meter
	km	kilometer (1E+03 m)
	cm	centimeter (1E-02 m)
	mm	millimeter (1E-03 m)
	µm	micrometer (1E-06 m)

	Symbol	*Name*
Mass	g	gram
	kg	kilogram (1E+03 g)
	mg	milligram (1E-03 g)
	µg	microgram (1E-06 g)
	ng	nanogram (1E-09 g)
	t	metric ton (1E+06 g)

	Symbol	*Name*
Flow Rate	mgd	million gallons per day
	cfm	cubic feet per minute
	Lpm	liters per minute

Unit Prefixes

centi	$1/100 = 1 \times 10^{-2} = 0.01 =$ E-02
milli	$1/1{,}000 = 1 \times 10^{-3} = 0.001 =$ E-03
micro	$1/1{,}000{,}000 = 1 \times 10^{-6} = 0.000001 =$ E-06
nano	$1/1{,}000{,}000{,}000 = 1 \times 10^{-9} = 0.000000001 =$ E-09
pico	$1/1{,}000{,}000{,}000{,}000 = 1 \times 10^{-12} = 0.000000000001 =$ E-12

Scientific Notation

Scientific notation may be used to express very large or very small numbers. A number smaller than 1 is expressed with a negative exponent, e.g., 1.3×10^{-6}. To convert this number to decimal form, the decimal point is moved left by the number of places equal to the exponent. Thus, 1.3×10^{-6} becomes 0.0000013.

A number larger than 10 is expressed with a positive exponent, e.g., 1.3×10^{6}. To convert this number to decimal form, the decimal point is moved right by the number of places equal to the exponent. Thus, 1.3×10^{6} becomes 1,300,000.

The power of 10 also is expressed as E. For example, 1.3×10^{-6} also can be written as 1.3E-06. The chart below shows equivalent exponential and decimal values.

1.0×10^{2}	= 1E+02	= 100	
1.0×10^{1}	= 1E+01	= 10	
1.0×10^{0}	= 1E+00	= 1	
1.0×10^{-1}	= 1E-01	= 0.1	
1.0×10^{-2}	= 1E-02	= 0.01	
1.0×10^{-3}	= 1E-03	= 0.001	
1.0×10^{-4}	= 1E-04	= 0.0001	
1.0×10^{-5}	= 1E-05	= 0.00001	
1.0×10^{-6}	= 1E-06	= 0.000001	One Millionth
1.0×10^{-7}	= 1E-07	= 0.0000001	
1.0×10^{-8}	= 1E-08	= 0.00000001	

Conversion Chart

Both traditional radiological units (curie, roentgen, rad, rem) and the Systeme Internationale (S.I.) units (becquerel, gray, sievert) are used in this report. Nonradiological measurements are presented in metric units with the English equivalent noted in parentheses.

1 centimeter (cm)	=	0.3937 inches (in)
1 meter (m)	=	39.37 inches (in) = 3.28 feet (ft)
1 kilometer (km)	=	0.62 miles (mi)
1 milliliter (mL)	=	0.0338 ounces (oz)
	=	0.061 cubic inches (in^3)
	=	1 cubic centimeter (cm^3)
1 liter (L)	=	1.057 quarts (qt)
	=	61.02 cubic inches (in^3)
1 gram (g)	=	0.0353 ounces (oz)
	=	0.0022 pounds (lbs)
1 kilogram (kg)	=	2.2 pounds (lbs)
1 curie (Ci)	=	3.7×10^{10} disintegrations per second (d/s)
1 becquerel (Bq)	=	1 disintegration per second (d/s)
	=	27 picocuries (pCi)
1 roentgen (R)	=	2.58×10^{-4} coulombs per kilogram of air (C/kg)
1 rad	=	0.01 gray (Gy)
1 rem	=	0.01 sievert (Sv)
1 millirem (mrem)	=	0.001 rem

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